FIG. 1A

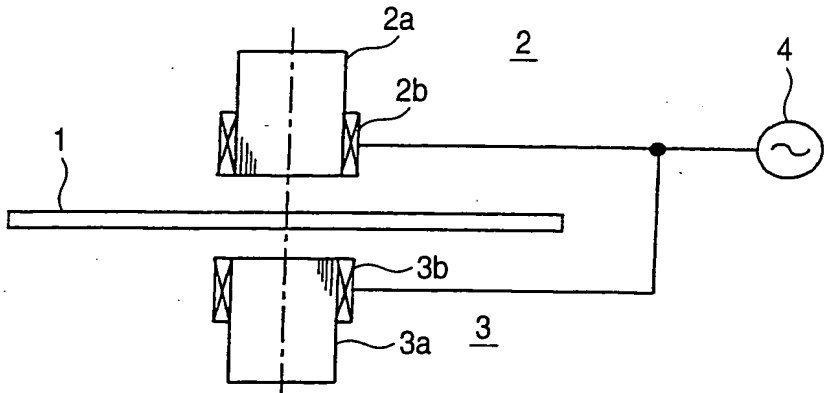
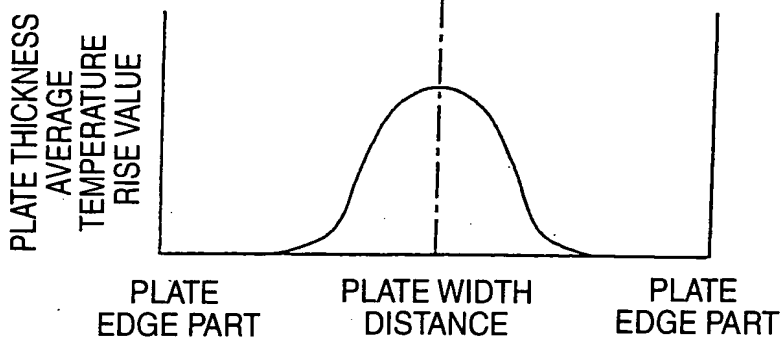


FIG. 1B



1: MATERIAL TO BE ROLLED
2, 3: INDUCTOR
2a, 3a: IRON CORE
2b, 3b: COIL

FIG. 2

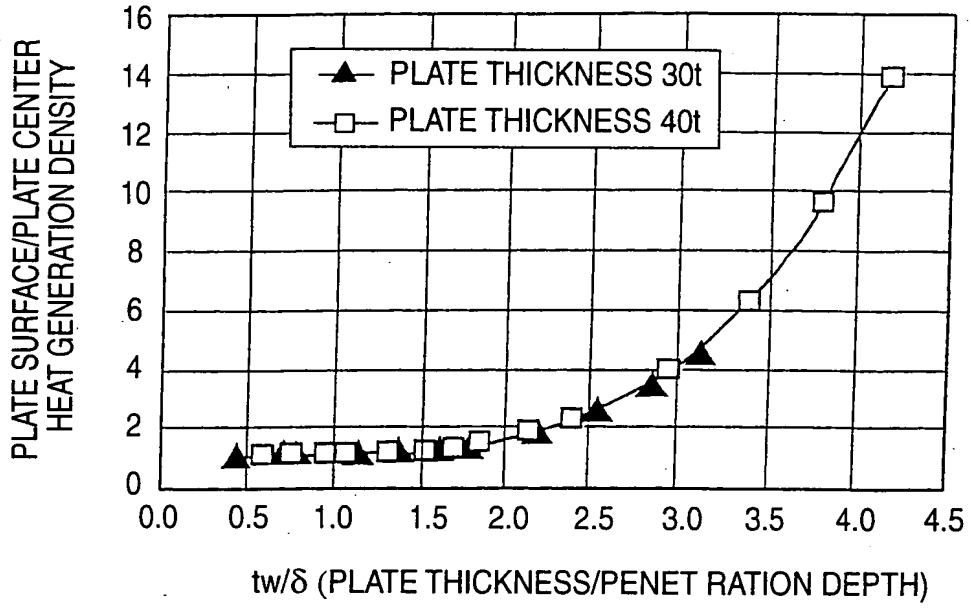


PLATE SURFACE/PLATE CENTER HEAT GENERATION DENSITY
PLATE THICKNESS 30t
PLATE THICKNESS 40t
16
14
12
10
8
6
4
2
0
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5
tw/δ (PLATE THICKNESS/PENET RATION DEPTH)

FIG. 3

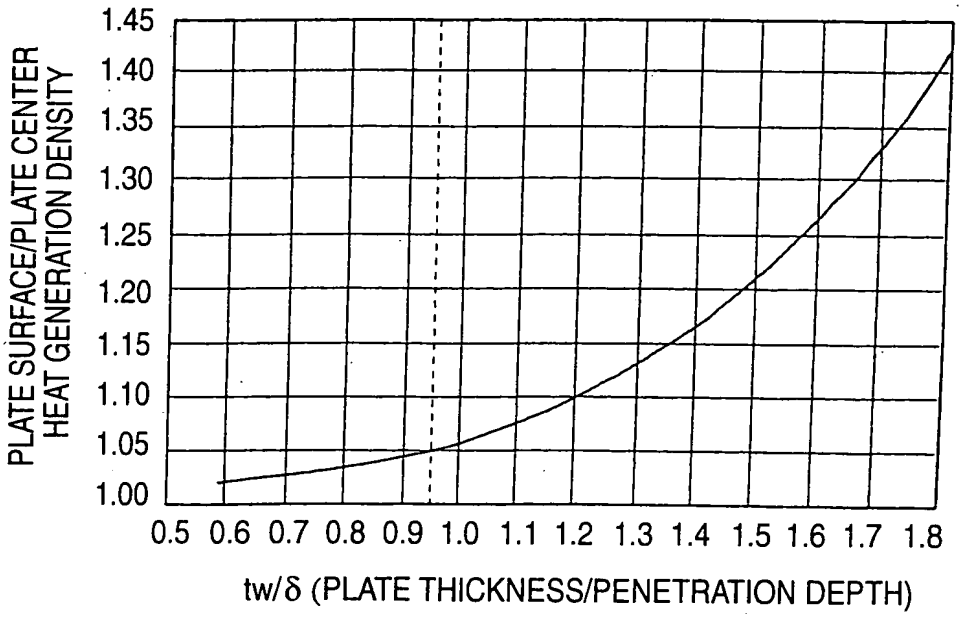


PLATE SURFACE/PLATE CENTER HEAT GENERATION DENSITY
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8
tw/δ (PLATE THICKNESS/PENETRATION DEPTH)

FIG. 4

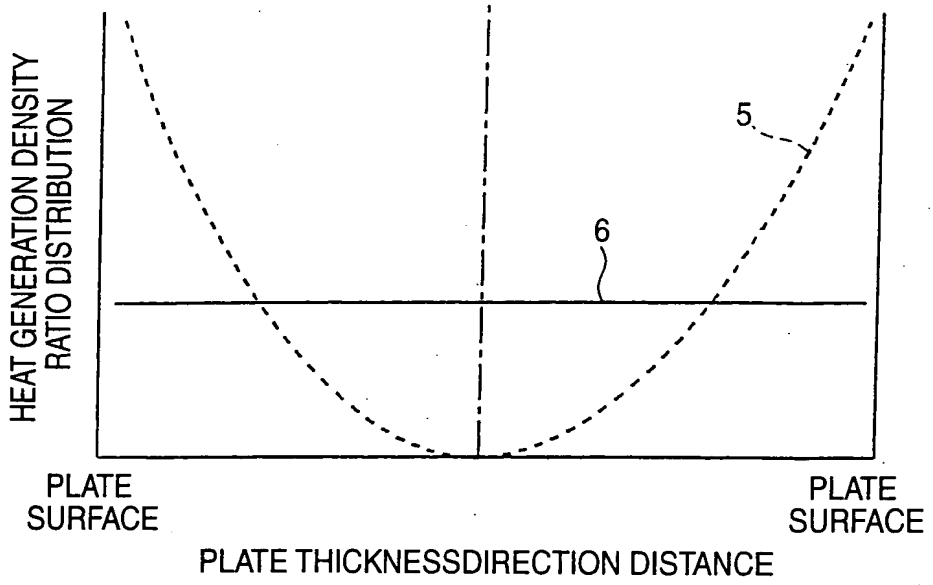

HEAT GENERATION DENSITY RATIO DISTRIBUTION
5
6
PLATE SURFACE
PLATE SURFACE
PLATE THICKNESSDIRECTION DISTANCE

FIG. 5 A

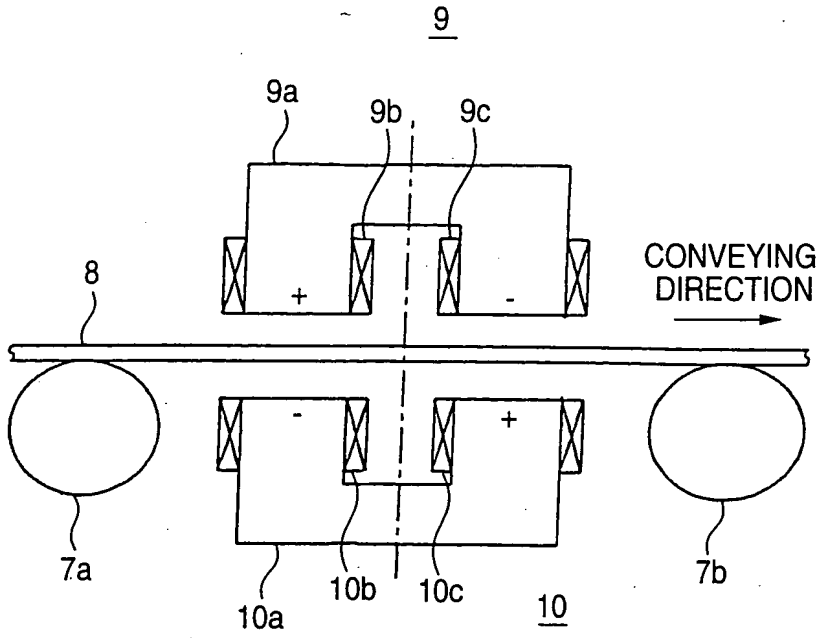


FIG. 5 B

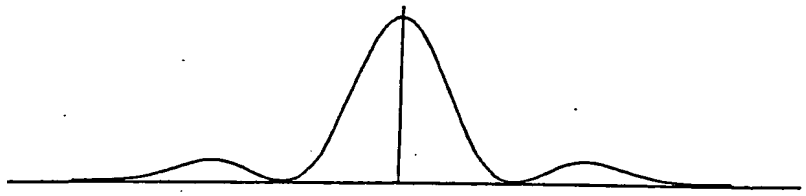
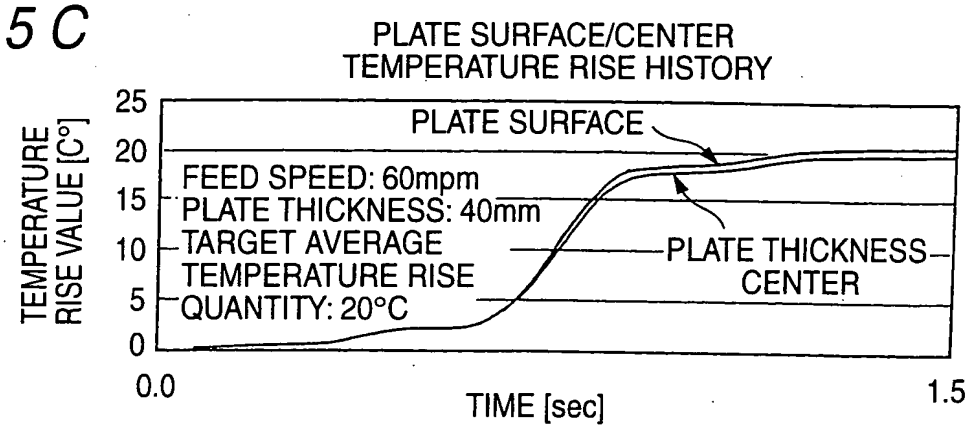


FIG. 5 C



7a, 7b: CONVEYING ROLL
8: MATERIAL TO BE ROLLED
9, 10: INDUCTOR
9a, 10a: IRON CORE
9b, 9c,10a,10b,10c: COIL

FIG. 6

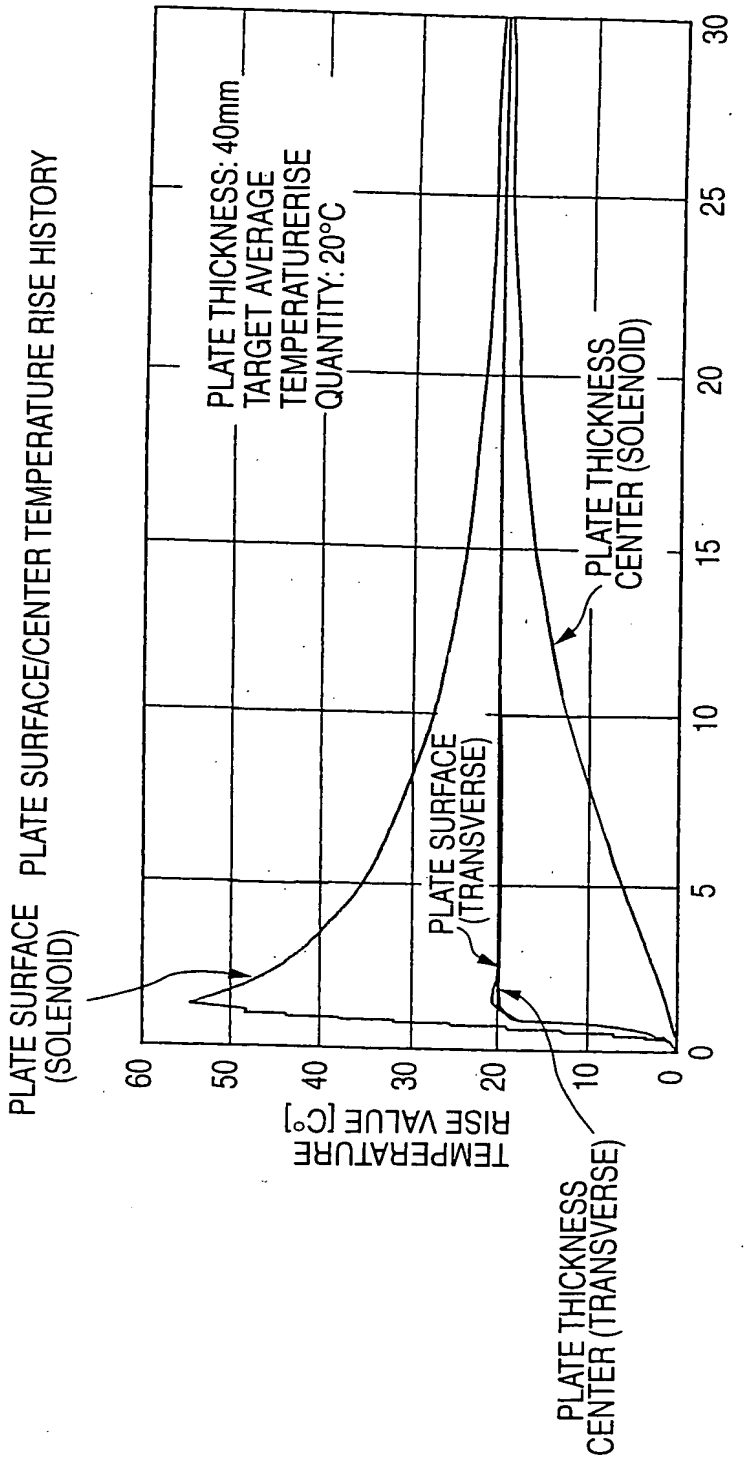


PLATE SURFACE/CENTER TEMPERATURE RISE HISTORY
PLATE THICKNESS: 40mm
TARGET AVERAGE TEMPERATURERISE QUANTITY: 20°C
PLATE SURFACE (SOLENOID)
PLATE SURFACE (TRANSVERSE)
PLATE THICKNESS CENTER (SOLENOID)
PLATE THICKNESS CENTER (TRANSVERSE)
TEMPERATURE RISE VALUE [C°]
0
10
20
30
40
50
60
0
5
10
15
20
25
30

FIG. 7B

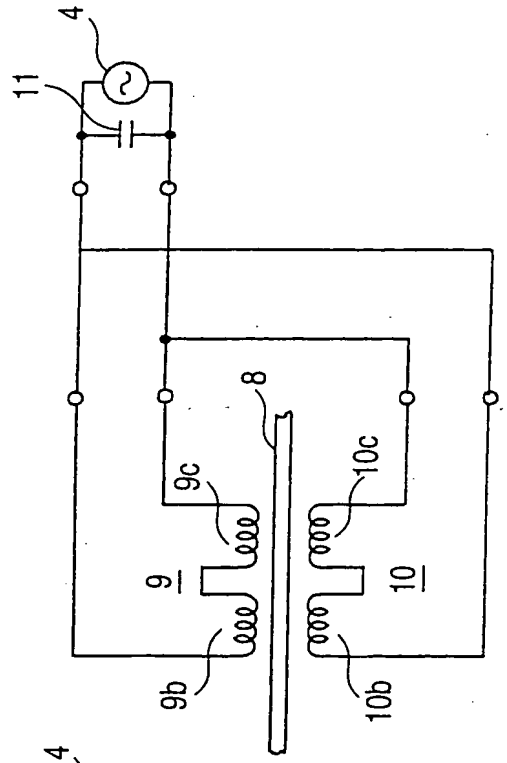
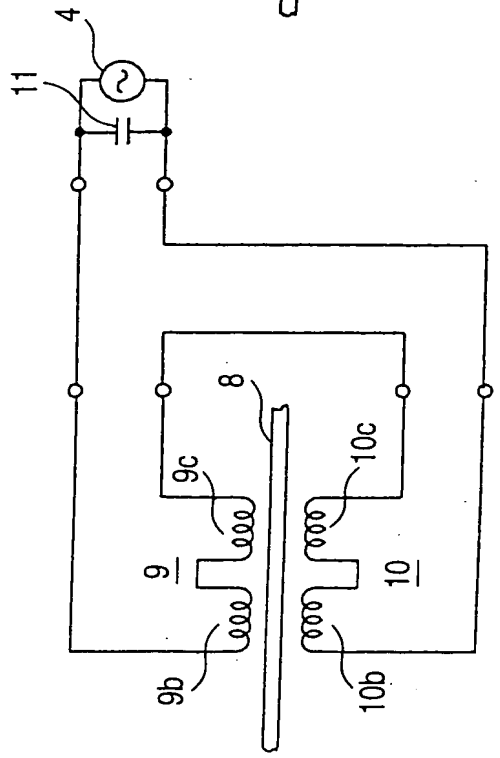


FIG. 7A



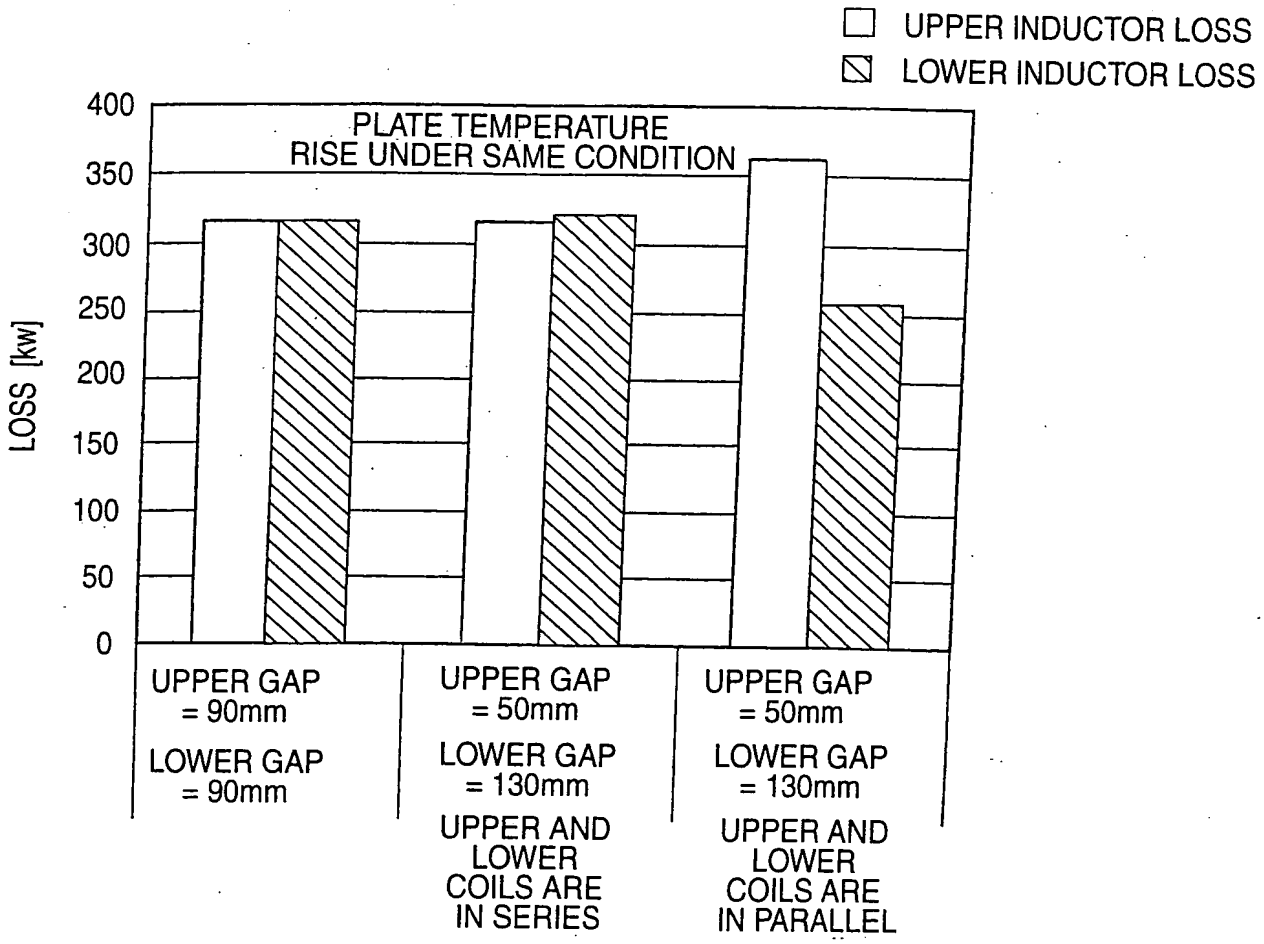


FIG. 8A FIG. 8B FIG. 8C

FIG. 9

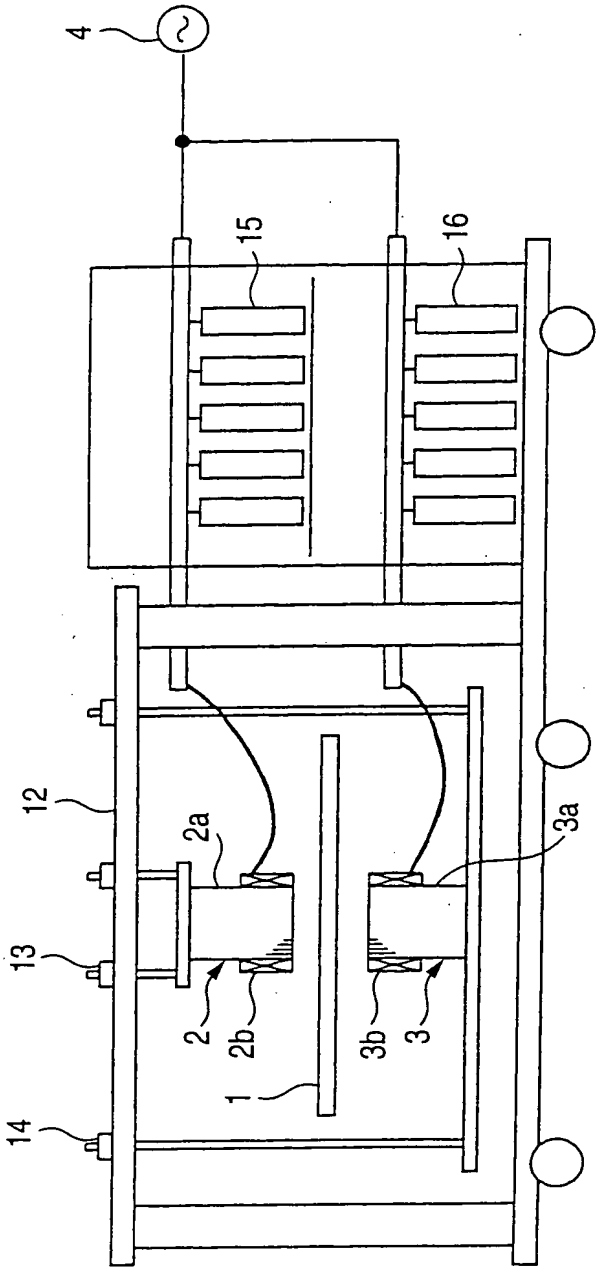


FIG. 10

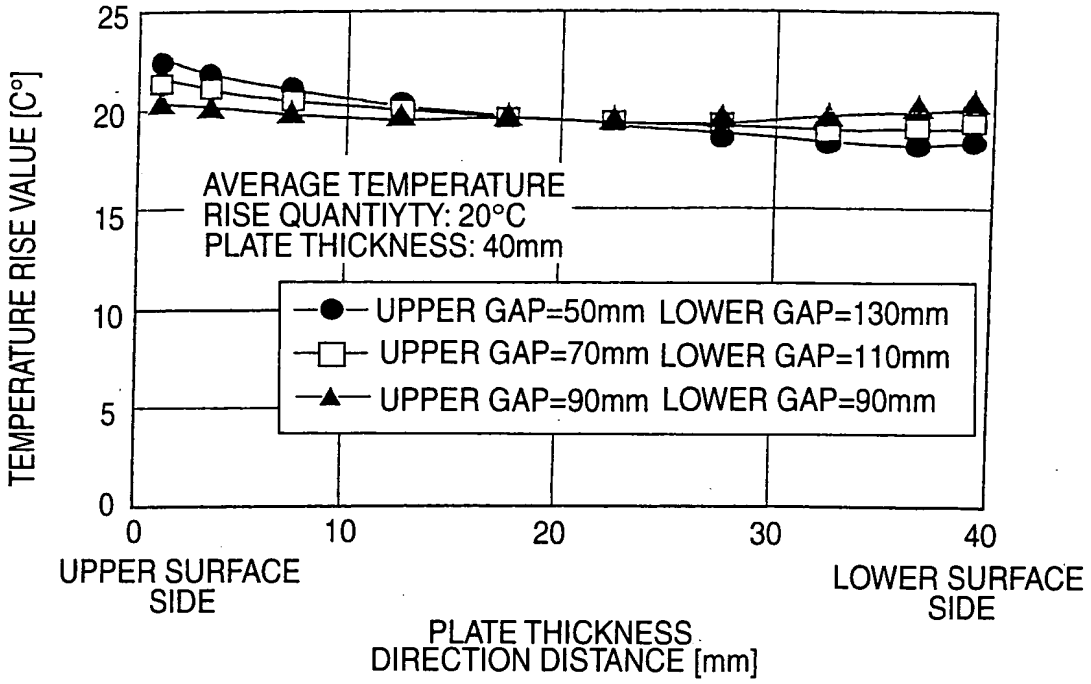

TEMPERATURE RISE VALUE [C°]
25
20
15
10
5
0
AVERAGE TEMPERATURE RISE QUANTIYTY: 20°C
PLATE THICKNESS: 40mm
UPPER GAP=50mm LOWER GAP=130mm
UPPER GAP=70mm LOWER GAP=110mm
UPPER GAP=90mm LOWER GAP=90mm
0
10
20
30
40
UPPER SURFACE SIDE
LOWER SURFACE SIDE
PLATE THICKNESS DIRECTION DISTANCE [mm]

FIG. 11

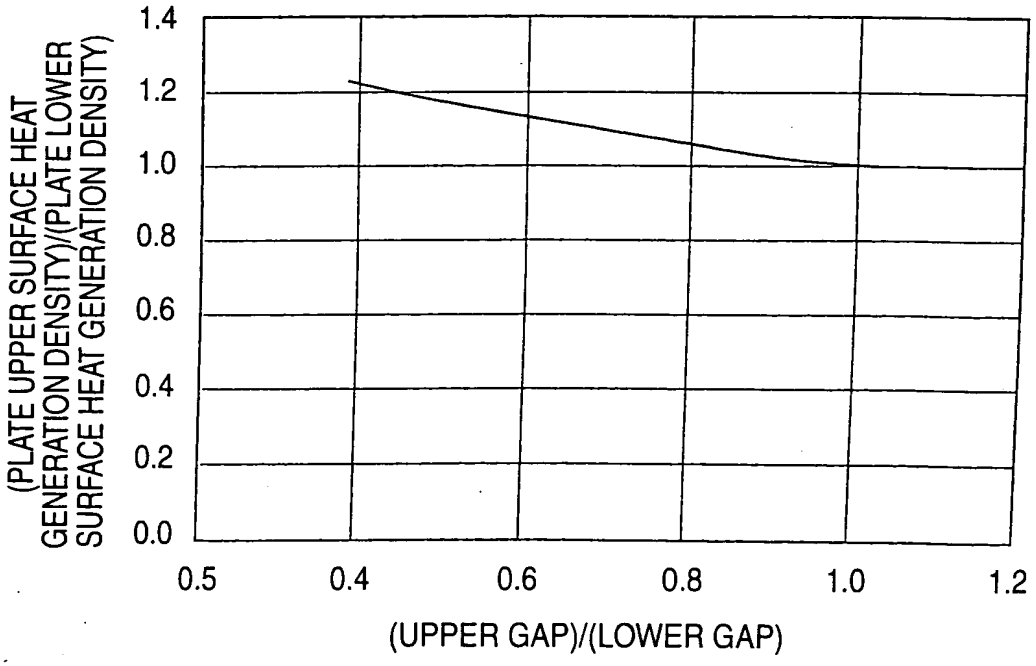
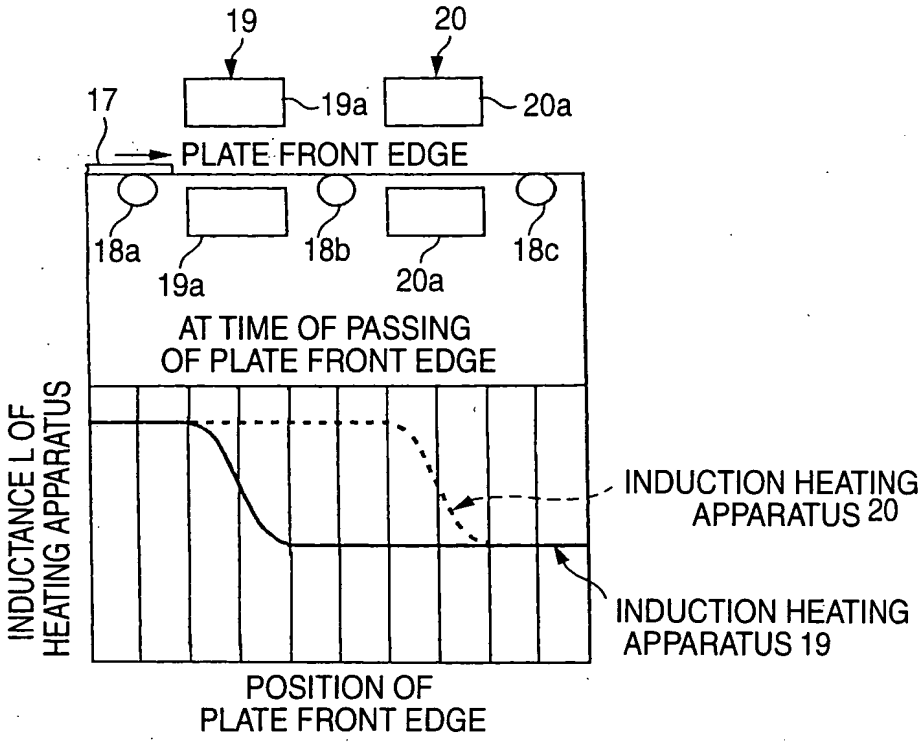
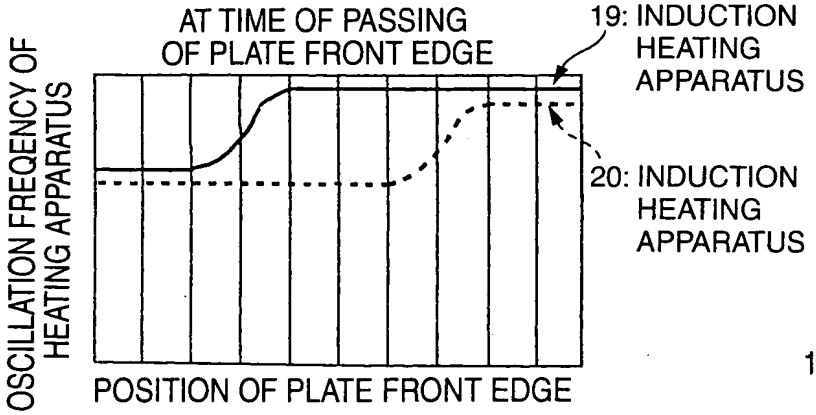

(PLATE UPPER SURFACE HEAT GENERATION DENSITY)/(PLATE LOWER SURFACE HEAT GENERATION DENSITY)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.5
0.4
0.6
0.8
1.0
1.2
(UPPER GAP)/(LOWER GAP)

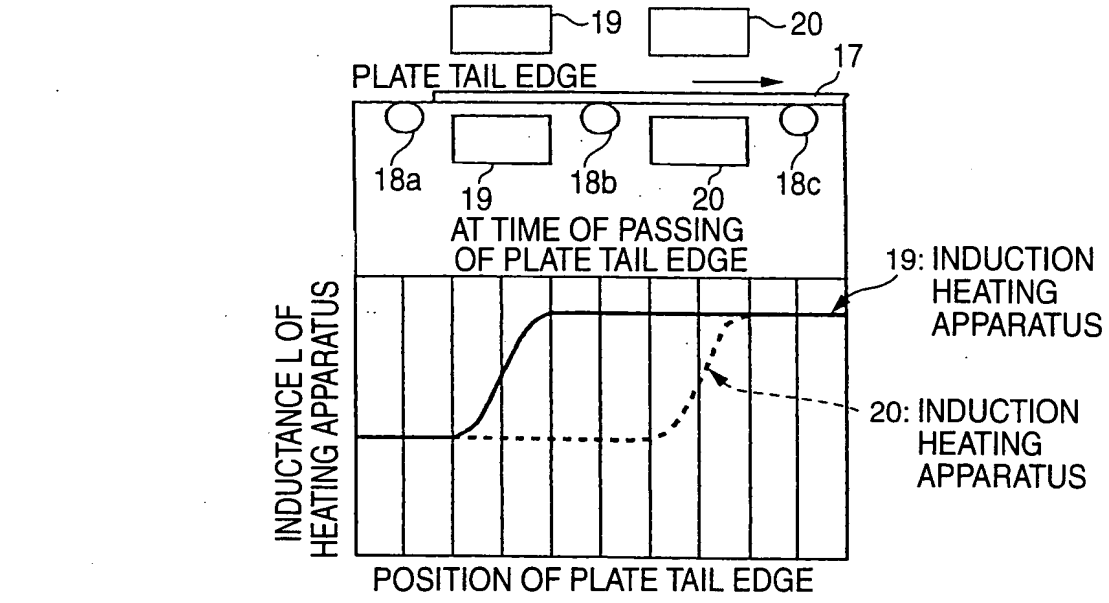
FIG. 12A

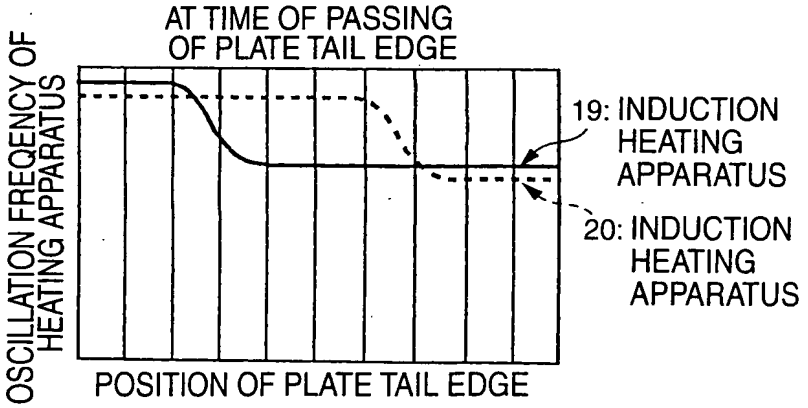




17: MATERIAL TO BE ROLLED
18a: CONVEYING ROLL
18b: CONVEYING ROLL
18c: CONVEYING ROLL
19, 20: INDUCTION HEATING APPARATUS
19a, 20a: INDUCTOR

FIG. 12B





17: MATERIAL TO BE ROLLED
18a: CONVEYING ROLL
18b: CONVEYING ROLL
18c: CONVEYING ROLL
19, 20: INDUCTION HEATING APPARATUS
19a, 20a: INDUCTOR